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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,159	07/15/2003	William Happer	4555-118 US	9513

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EXAMINER	
CHANG, JOSEPH	

ART UNIT	PAPER NUMBER
2817	

DATE MAILED: 12/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/620,159	HAPPER ET AL.	
	Examiner	Art Unit	
	Joseph Chang	2817	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-9,11-14,16-19,21-24,26-29,31-34 and 36-39* is/are rejected.

7)☒ Claim(s) *5,10,15,20,25,30,35 and 40* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 July 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/9/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "means for generating atoms in a ground-state sublevel of maximum or minimum spin from which end resonances can be exited" as it relates to the claims 11, 16, 31 and 36 and "means for generating hyperfine transitions of said atoms by applying magnetic field oscillating at Bohr frequency of the end resonances" as it relates to the claims 11, 21 and 31; and "means for pumping the atoms with light modulated at a Bohr frequency of the end resonances for exciting transition in the atoms" as it relates to the claims 16, 26 and 36 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6-9, 11-14, 16-19, 21-24, 26-29, 31-34, 36-39 are rejected under 35 U.S.C. 102(b) as being anticipated by Ohtsu US Pat. No. 5,148,437.

Regarding Claim 11, Ohtsu discloses a system (FIG 1B) for operating an atomic clock (Col. 1, lines11-15) comprising: means for generating atoms (21) in a ground-state sublevel (hyperfine level. see FIG 4) of maximum or minimum spin (inherent property of atom existed at any stage of energy levels), from which end resonances (21, a double resonance section) can be exited; and means for generating hyperfine transitions of the atoms by applying magnetic fields (21b, Col.9, lines 25-26) oscillating at Bohr frequencies of the end resonances (intrinsic property of atoms to be exited).

Regarding Claim 12 and 13, Ohtsu discloses that the magnetic field oscillates at the Bohr frequency w- (or w+) of the resonance (Col. 2, lines 40-Col.3, line 28: modulation angular frequency intrinsically and mathematically contains plus and minus frequencies).

Regarding Claim 14, Ohtsu discloses that the atoms are rubidium atoms (Rb, Col.7, line 49) or cesium atoms (Cs, Col.7, line 49).

Regarding Claims 31-34, as discussed in the Claims 11-14 rejections, Ohtsu discloses a system (FIG 1B) for operating an atomic clock. The preamble recitations "for operating a magnetometer" are mere statements of purpose or use. The prior art structure is capable of performing the intended use as recited in the preamble.

Regarding Claims 1-4, as discussed in the Claims 11-14 rejections, Ohtsu discloses a system (FIG 1B) for operating an atomic clock, which would necessarily perform the method claims 1-4.

Regarding Claims 21-24, as discussed in the Claims 11-14 rejections, Ohtsu discloses a system (FIG 1B) for operating an atomic clock, which would necessarily perform the method claims 1-4. The preamble recitations "for operating a magnetometer" are mere statements of purpose or use. The prior art structure is capable of performing the intended use as recited in the preamble.

Regarding Claim 16, Ohtsu discloses a system (FIG 1B) for operating an atomic clock (Col. 1, lines11-15) comprising: means for generating atoms (21) in a ground-state sublevel (hyperfine level. see FIG 4) of maximum or minimum spin (inherent property of atom existed at any stage of energy levels), from which end resonances (21) can be exited; and means for pumping the atoms with light modulated (LASER Module 24a) at a Bohr frequency of the end resonance for exiting transitions in the atoms (intrinsic property of atoms to be exited).

Regarding Claim 17 and 18, Ohtsu discloses that the magnetic field oscillates at the Bohr frequency w- (or w+) of the resonance (Col. 2, lines 40-Col.3, line 28: modulation angular frequency intrinsically and mathematically contains plus and minus frequencies).

Regarding Claim 19, Ohtsu discloses that the atoms are rubidium atoms (Rb, Col.7, line 49) or cesium atoms (Cs, Col.7, line 49).

Regarding Claims 36-39, as discussed in the Claims 16-19 rejections, Ohtsu discloses a system (FIG 1B) for operating an atomic clock. The preamble recitations "for operating a magnetometer" are mere statements of purpose or use. The prior art structure is capable of performing the intended use as recited in the preamble.

Regarding Claims 6-9, as discussed in the Claims 16-19 rejections, Ohtsu discloses a system (FIG 1B) for operating an atomic clock, which would necessarily perform the method claims 6-9.

Regarding Claims 26-29, as discussed in the Claims 16-19 rejections, Ohtsu discloses a system (FIG 1B) for operating an atomic clock, which would necessarily perform the method claims 6-9. The preamble recitations "for operating a magnetometer" are mere statements of purpose or use. The prior art structure is capable of performing the intended use as recited in the preamble.

Allowable Subject Matter

Claims 5, 10, 15, 20, 25, 30, 35, 40 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the best prior art of record, Ohtsu, taken alone or in combination of other references, does not teach or fairly suggest "atoms are pumped with circularly polarized, D1 resonance light for the rubidium or cesium atoms".

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Liberman et al. discloses a gas cell for a miniature atomic frequency standard.

Chantry et al. discloses a gas cell for a miniature atomic frequency standard using microwave exciter.

Happer et al. discloses an atomic clock with simultaneous locking of field and frequency.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Chang whose telephone number is 571 272-1759. The examiner can normally be reached on Mon-Fri 0700-1730.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Pascal can be reached on (571) 272-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Joseph Chang

Joseph Chang
Patent Examiner
Art Unit 2817.